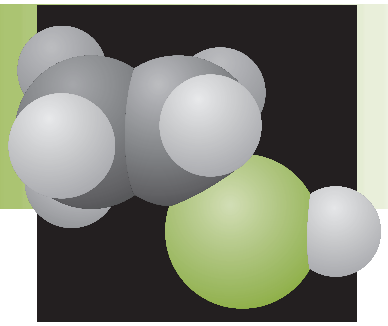
CHEMICALS
Project Fact Sheet



Computational Fluid Dynamics for Multi-phase Flow

Benefits

- Optimized processes with greater energy efficiency
- Increased production capacity in industrial processes that use fluidized bed production
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Applications

This technology can be used in ore smelting, electric power generation, and in the inorganic chemical industry, including sodium carbonate, gypsum (wallboard), and limestone.

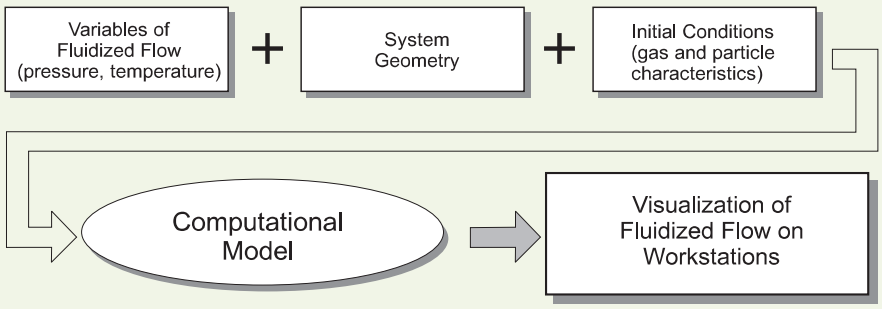
Specific catalytic applications include hydrocarbon cracking and reforming, oxidation of naphthalene, and many others. Some non-catalytic uses include roasting of sulfide ores, coking of petroleum residues, calcination of limestone and drying.

Computer models will improve productivity in solid-to liquid processing for widespread industry use

Computational fluid dynamics (CFD) is the use of computer models to calculate and predict the properties of flowing materials—gas, liquid, solid or combinations—in industrial processes. In many chemical processing applications, such as soda production used is glass manufacture and mineral ore processing, solid materials are crushed and processed at high temperature. In fluidized bed processes, solid particles (catalytic or non-catalytic) are suspended by a gas, with the suspended mass taking on many properties similar to liquids. CFD could analyze and optimize these fluidized bed processes to improve productivity and save energy throughout the chemical industry.

Existing computer technology analyzes the fluidized beds of crushed coal that are burned in utility boilers to generate electricity. In this project, computer technology developed for fossil energy systems will be adapted for widespread use by the chemical and petroleum refining industries.

Modeling of Fluidized Bed Processing



Computer models can visually predict process operating conditions so industrial productivity can be optimized.

Project Description

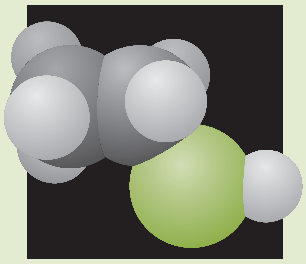
Goal: Adapt the MFIX model to analyze and predict fluidized bed processing in chemical and petroleum refining industries.

MFIX is a multiphase flow simulation model of crushed coal conversion. This model, developed at the Federal Energy Technology Center, will be adapted by Oak Ridge National Laboratory. MFIX will be modified for use across multiple computers (i.e., distributed computing) in communication and internet applications. This improvement will increase MFIXs computational speed thereby enhancing its versatility. Lawrence Berkeley Laboratory will develop visual aids for MFIX to allow computations to be visualized and promote a "big picture" understanding of the flow situation. Dow Corning Corporation will test the technology in their silicone production processes. Fluent Technology, a computational fluid dynamic software business, will license and market the technology.

Progress and Milestones

This three-year project will include the following activities:

- Improvements to MFIX are expected to be complete by 2001.
- Visual aids are scheduled to be complete by 2002.
- Pilot test and demonstration of MFIX in a chemical fluidized bed application will be complete by 2003.
- A private company will commercialize the technology by 2004.



Project Partners

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February 1999